

Chatham House
New Generation Nuclear: From policy to implementation
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Thank you Lady Judge and thank you to the Royal Institute of International Affairs for inviting me to take part in this international conference. In keeping with the stated focus of this conference, identifying and removing barriers to building new nuclear power plants, I am pleased to be here this morning to give you my views on the expansion of nuclear power, lessons learned, and the necessary roles of industry, regulators and government.

The energy policies of many countries are being primarily driven by three considerations – economics, energy security, and environmental impacts. The ever-increasing demand for energy to fuel the growing economies of the world is overtaking the worldwide growth in the supply of fossil fuels – creating price volatility and uncertainty. Nations are realizing that depending on fossil fuels from external sources is not in the best interest of their energy security. The environmental impacts associated with greenhouse gas emissions from the increasing use of fossil fuel could have devastating effects on our planet that are not acceptable.

Given these considerations, the international trend is leading us to the expansion of the nuclear power and renewable resources such as wind, solar, and geothermal. Some countries, including the United States, currently using nuclear power are planning on increasing their nuclear capacity and many other countries are seeking to introduce nuclear power into their energy portfolio for the first time. The IAEA estimates that the number of nations with nuclear power could grow from the present 31 nations to over 80 nations by the middle of this century.

My involvement with the civilian nuclear power program began in 1969, so I participated in both the rapid rise and then the decline of nuclear power in the United States. I am optimistic we are now seeing a rebirth of nuclear power in the U.S. such that nuclear power can finally achieve the potential we saw in the 1960's and early 1970's and play a major role in meeting the world's energy needs. In the United States, 240 nuclear plants were under contract in 1974 – with 41 plants ordered in a single year, 1973. The United States was developing a domestic capability to build more than twenty new nuclear plants per year. Projections at the time were that 1,000 nuclear plants would be operating in the United States by the year 2000. France was also moving aggressively to build nuclear plants and in

fact built 55 nuclear plants over about a 15 year period from the 1970's through the 1980's. This was very impressive considering that France's gross domestic product during this time was only about 18% of that of the United States.

The United States' ability to develop a nuclear industry infrastructure from scratch, develop and implement a licensing structure, export peaceful nuclear technology to our allies around the world, and safely bring over 100 plants on line in the U.S. was a major accomplishment. But, what brought the plans to build several times that number to an end in the United States? One could say that we encountered the "perfect storm." The oil embargo of 1973 caused energy prices to spike, and consumers responded by reducing consumption. Not long afterward, our economy went into a recession – further reducing energy demand. In the late 1970's, interest rates spiraled upward with our prime rate exceeding 20%. Our electrical utilities no longer needed all of the new generating plants that they had ordered, and so began canceling orders and/or stretching out construction schedules. Since most of the new nuclear plants were still being licensed or early in the construction process, and nuclear plants had the highest capital cost, they made up the highest percentage of the cancellations and stretch outs. For the plants that were not cancelled, extraordinarily high interest rates, high capital cost, and a lengthened construction schedule resulted in significant cost increases. The final event of the perfect storm was the Three Mile Island accident. Although no one was hurt in the accident, safety requirements for all U.S. nuclear plants were thoroughly reevaluated. The resulting licensing and construction delays had an enormous financial impact, causing one utility to enter bankruptcy and nearly causing several others to do the same. Utilities with nuclear power plants saw their stock values plummet, and public sentiment in the U.S. turned against nuclear power.

Another contributing factor was a failure of politicians and policy makers to take a long-term view in the development of energy policy. In the United States, nuclear expansion was effectively abandoned in favor of energy sources with lower up-front costs of capital, like natural-gas-fired plants, because it was an easier alternative given the economic circumstances at that time. As a result, the United States nuclear infrastructure, both in terms of human capital and production facilities, atrophied and we now find ourselves having to rebuild it.

Decades later, it is clear that the United States would have been much better served by continuing to pursue nuclear power. France continued to pursue and heavily invest in nuclear power. Today, France generates approximately 80% of its electricity from nuclear power and is much less vulnerable to fluctuations in global energy prices. The key to success was the French government's long-term energy

security strategy that recognized the important role nuclear energy needed to play in France's electrical energy production (coupled with expanding the use of electricity in their transportation sector). All of France's political parties agreed with this strategy, a strategy that allowed France to maintain a consistent energy policy and not be sidetracked by temporary variations in energy supply and demand.

Today, we are facing a challenging environment for the expansion of nuclear power with the global credit crisis making large capital investments more difficult and prices of alternative energy sources, such as oil, in a temporary lull. We cannot allow our nuclear ambitions to be distracted by temporary and ultimately unsustainable alternatives. We all must remain committed to a consistent energy policy that will take long-term energy-security needs into account and withstand both marketplace variations and political transitions.

We can and must learn from these successes and failures from the first nuclear expansion. First and foremost, we must maintain the safe, secure, and environmentally sound operation of the existing fleet of nuclear power plants. An accident or serious incident *anywhere* in the world will likely have a serious negative affect on the nuclear expansion *everywhere* in the world. Public acceptance of nuclear power is at an all-time high and we must ensure that it is maintained through a better understanding of nuclear power and its benefits to the economies of the world and the environment.

We must rebuild and maintain a robust and sustainable nuclear infrastructure around the world to support what has become a global enterprise. Today, the nuclear industry is evolving and aligning itself to compete effectively in the global marketplace. Each new nuclear plant requires a large number of vendors and suppliers – vendors and suppliers that are dependent, interlocked, and often located in different countries.

Industry, regulators and governments all play a key role in realizing a nuclear expansion that is sustainable and allows countries to make sound decisions to pursue new nuclear power plants.

Industry's role is the most straightforward: industry must provide the marketplace with economic, safe, and secure nuclear power plants. Providing a high-quality product to the marketplace ensures that industry has worked with and provided feedback to the relevant regulators and governments. Industry should also be providing input into the government's R&D plans so that government R&D is

focused in areas that will yield results for industry – results that are relevant to the marketplace.

The regulator's role is obviously to regulate the nuclear industry and ensure that the new nuclear plants are being designed, built, operated, and supervised properly. With many nuclear industries operating in more than one country, regulators from various countries should come together to develop mutually acceptable standards, codes, and criteria to certify standardized plant designs. While regulators will always seek to independently assure themselves that a nuclear plant is safe before granting a license, much time and money can be saved through international standardization of safety requirements.

The most important role of government is to establish energy policy. Energy policy that will consider the long-term energy security needs, will withstand both marketplace variations and political transitions, and serve as the basis of government actions.

Beyond policy, governments' role should be to remove roadblocks or barriers and facilitate nuclear expansion. The United States government has, for example, utilized important tools in the form of risk insurance, production tax credits, and loan guarantees that help encourage industry to take action to build new plants. Government-backed risk insurance guarantees financial protection from regulatory- and litigation-related delays beyond the control of the project sponsors and production tax credits offset some first-of-a-kind expenses.

The results of these efforts to encourage new reactor construction can already be seen. As of today, the U.S. Nuclear Regulatory Commission has received 17 construction and operating license applications for 26 reactors. To support construction, DOE has received Federal loan guarantee applications for 14 projects that include 21 reactors, totaling \$122 billion. The estimated total cost for these 14 projects is \$188 billion. The \$66 billion difference is being offered by the applicants in private equity or non-U.S. Government-guaranteed debt. This is an enormous amount of debt and equity for the private sector to place at risk and reflects their growing confidence in the return of nuclear power. Unfortunately, Congress has only granted DOE loan guarantee authority for up to \$18.5 billion – a small fraction of the \$122 billion that has been requested by industry. The next Congress will have the responsibility and opportunity to ensure that vital investments are made in our energy security.

International cooperation plays many varied and significant roles in the expansion of nuclear power around the world. One key component is a global nuclear liability regime that will ensure the availability of cost-mitigation in the event of a nuclear incident and will provide the legal certainty necessary to expand nuclear power. The Convention on Supplementary Compensation for Nuclear Damage (CSC) was developed under the auspices of the IAEA during the 1990's, and adopted at a diplomatic conference in 1997. The United States ratified the CSC this spring and is urging other countries to do the same. Without an assured liability regime and consistency of standards and regulations from country to country, multinational companies will be severely inhibited in their ability to begin new build programs across borders.

Although much work remains, the nuclear resurgence is gaining momentum and the groundwork has been laid for the growth of civilian nuclear power worldwide. I believe we are again looking at a potential expansion of nuclear energy like that anticipated in the early 1970's, and as we move forward it is important to remember the lessons of the past, including the importance of standardized designs and consistent licensing requirements.

As the world seeks to increase its energy supplies to sustain its continued economic growth, while responsibly addressing greenhouse gas emissions, nuclear power must expand. In the United States we recognize this and understand that nuclear energy policy itself must become sustainable through many decades and political Administrations and must adapt to the international nature of today's nuclear power industry. Over sixty years ago, nuclear power was born through the extraordinary and consistent efforts of leading scientists and engineers. Today, it will require equally consistent and concerted efforts on the parts of our industry leaders, politicians, and regulators to carry nuclear energy into the future.

Thank you for inviting me to participate in this conference. I look forward to answering any questions you may have.